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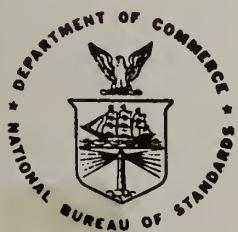
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Proceedings of the Third LAN-Transport Workshop

Report of the Third Workshop for Local Area Network
Implementors of the NBS Specifications of the
International Standards Organization Transport
Class 4 Protocol — Special Interest Group on
File Transfer Protocol

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
Institute for Computer Sciences and Technology
Systems and Network Architecture Division
Washington, DC 20234

July 18 - 20, 1983



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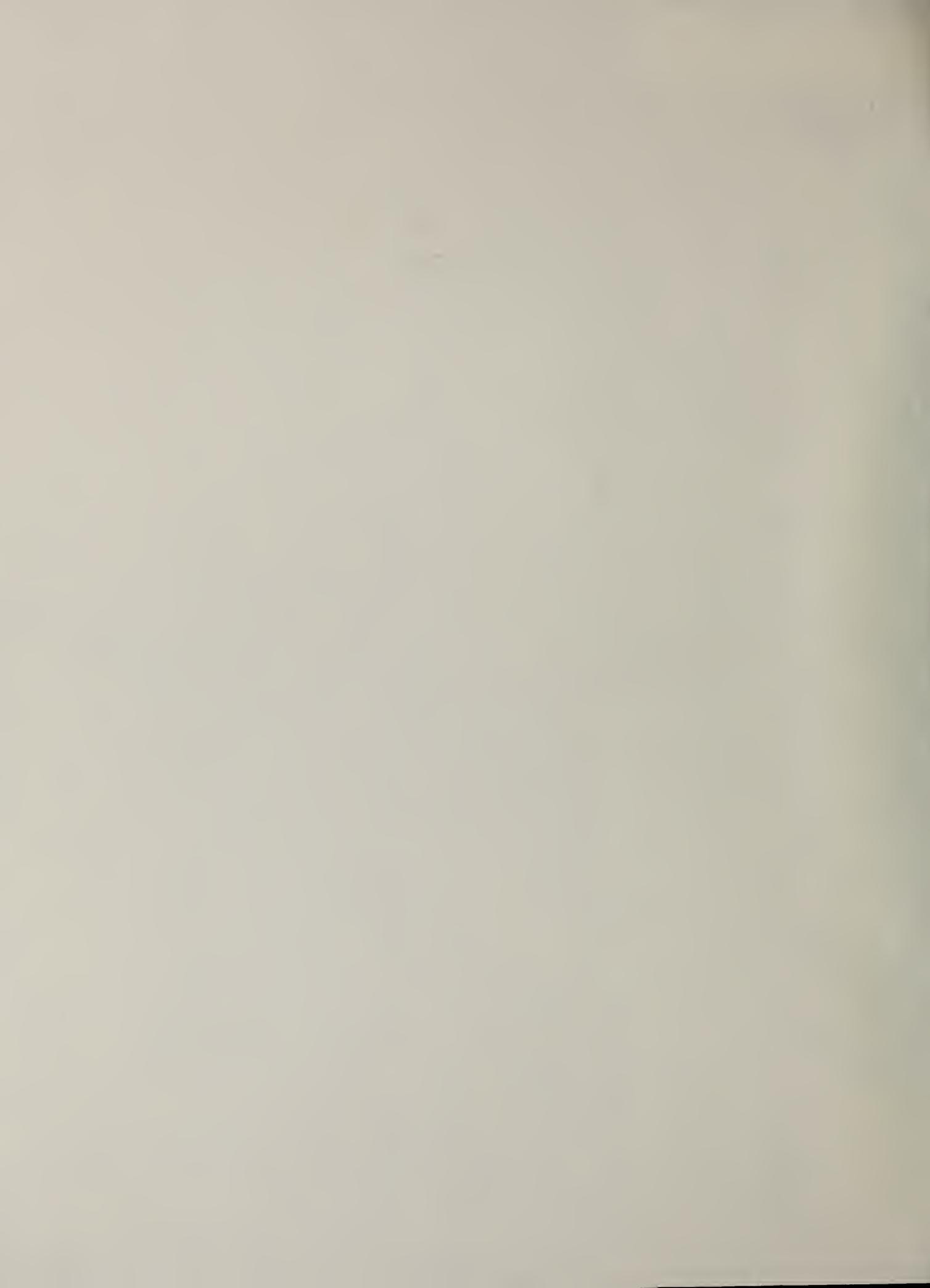
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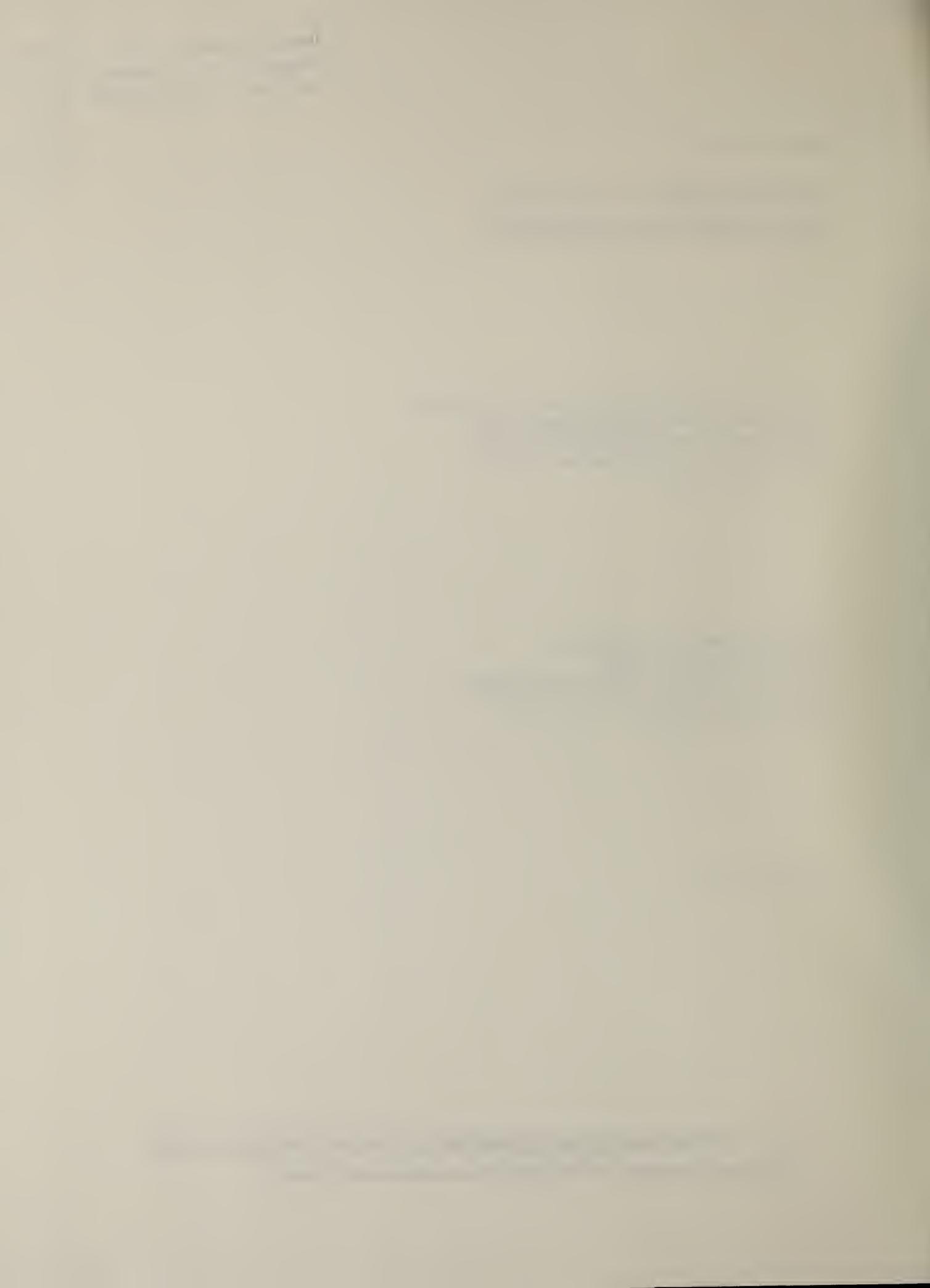
PROCEEDINGS OF THE THIRD LAN-TRANSPORT WORKSHOP

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**U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, Secretary
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director**

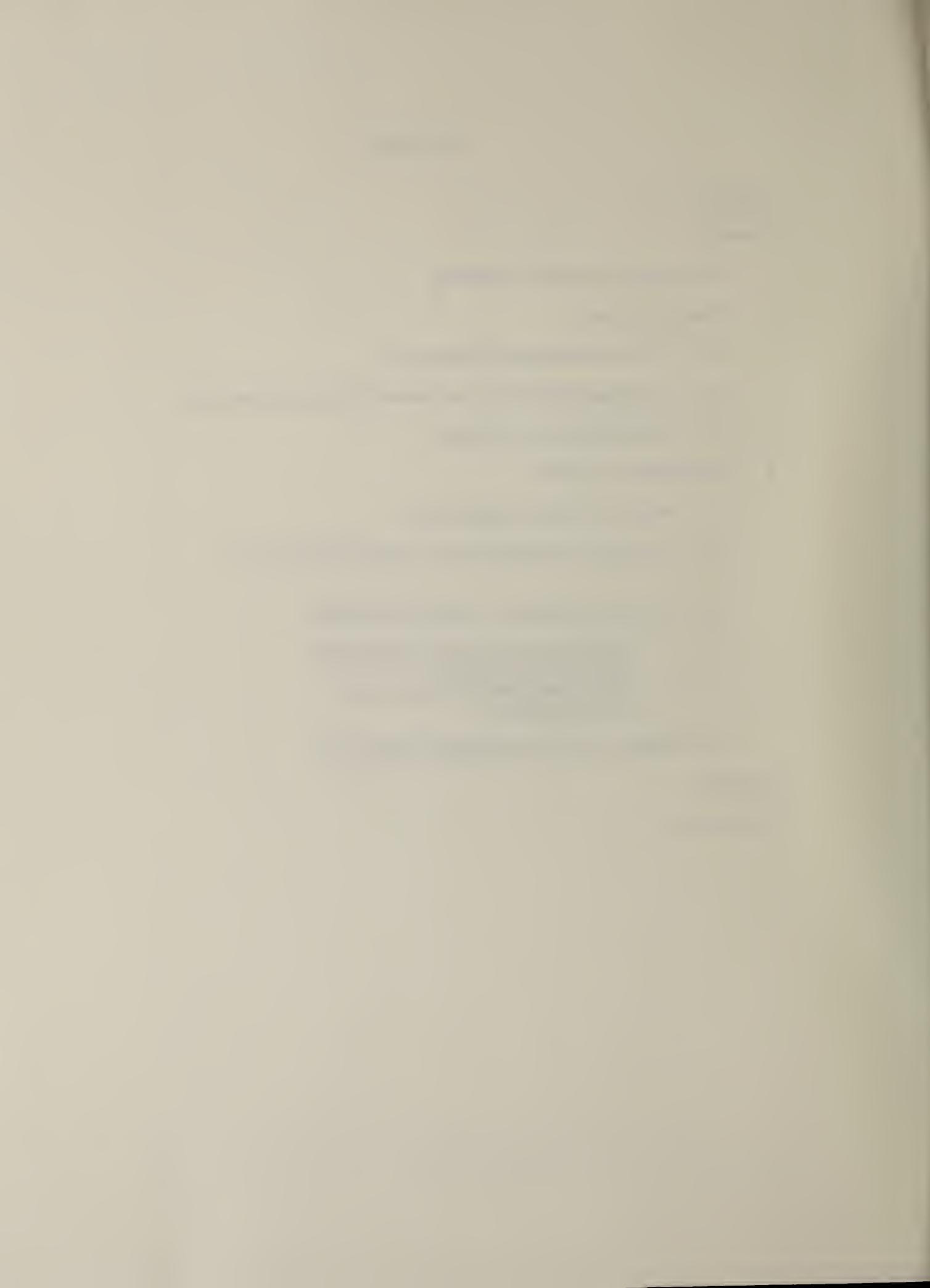


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ABSTRACT

The National Bureau of Standards' Institute for Computer Sciences and Technology (ICST) has prepared specifications for the International Organization for Standardization's (ISO's) Class 4 Transport Protocol. At the request of a number of companies, ICST organized a workshop series for implementors of these specifications using local area networking technology. The first workshop focused on implementation techniques and strategies so that a multi-vendor demonstration of these protocols can occur at a major computer conference in 1984 — targeted for the NCC 1984. Primarily, the details of CSMA/CD and Transport Class 4 were discussed and parameters were selected. A second workshop focused on token bus LANs and file transfer applications to be run at the targeted 1984 demonstration. This report covers the third in the series of LAN/Transport Workshops, and reports agreements on the specifics of the file transfer protocol.

Keywords: file transfer protocol; communication protocols; computer networks; local area networks.

SUMMARY

This report documents the third workshop of the LAN/Transport Workshop Series for implementors of the ICST specification of the ISO Class 4 Transport Protocol over IEEE 802 compatible LANs using local area networking technology. Specifically, this report describes the agreements reached by participants concerning the service and protocol of file transfer protocol (FTP). During the second workshop, a subset of the ISO emerging FTP was chosen to operate over transport to provide demonstrable applications. Following the second workshop, NBS prepared a more complete service and protocol description of the selected FTP subset. That document constituted the primary input to the third workshop.

The agreements reached concerning the specification of the FTP subset of service and protocol are documented in the body of this report. A revised service and protocol textual description will be produced and distributed as a result of the third workshop. Differences from the present ISO specification will be clearly marked in that document. They are of two forms. In some instances (for purposes of easing implementations for the projected demonstration) restrictions have been placed upon the ISO specification. The maximum length of file names and their ASCII character composition are examples. In other instances the ISO work has not progressed to the point of defining the protocol in sufficient detail. An example is Protocol Control Information (PCI) encoding. After the forthcoming textual description of the FTP service and protocol, a formal description

will be prepared and distributed using ISO SCI6/WGI Subgroup B notation.

In addition to work on the FTP, some file management services were presented and discussed. These services, in the form of utilities, will provide the basis for file creation on file server systems for the demonstration. A document describing these utilities will be distributed in the near future.

The participants agreed to the need for a fourth workshop, to be held as earlier planned on October 27 and 28 in Gaithersburg, Maryland. An announcement will be mailed to the current LAN/Transport Workshop Series distribution list in the near future.

1. PARTICIPANTS OF THE THIRD WORKSHOP

The third workshop, chaired by Mr. Maris Graube, Tektronics, was attended by the following.

Ken Aird
Hewlett Packard
3404 E. Harmony Road
Ft. Collins, Colorado 80525
(303) 226-3800

James Berets
Bolt, Beranek, and Newman, Inc.
10 Moulton Street
Cambridge, Massachusetts 02238
(617) 497-2593

Ron Floyd
General Motors
Technical Center MD-66
Warren, Michigan 48090
(313) 575-0877

Atul Garg
Hewlett Packard
19420 Homestead Road
Cupertino, California 95014

Conrad Geiger
NBI, Inc.
P.O. Box 9001
Boulder, Colorado
(303) 444-5710

Maris Graube
Tektronix
Box 500, MS 50-473
Beaverton, Oregon 97077
(503) 627-1792

John Heafner
National Bureau of Standards
B218/225
Washington, D.C. 20234
(301) 921-3537

Dittmar Janetzky
Siemens AG
P.O. Box 211080
7500 Karlsruhe, Germany
(721) 595-2350

Ken Kanaby
General Motors
Technical Center, MD-66
Warren, Michigan 48090
(313) 575-0899

Chak Lai
Digital Equipment Corporation
21333 Haggerty
Novi, Michigan 48050
(313) 348-8900

Andy Luque
Tektronix, Inc.
P.O. Box 500, MS 92-803
Beaverton, Oregon 97062
(503) 629-1343

Joseph R. Maixner
Associated Computer Consultants
2901 Park Avenue
Soquel, California 95073
(408) 425-0937

June Nishimoto
Hewlett-Packard/IND
246 Edlee Avenue
Palo Alto, California 94306
(415) 494-0652

James Quigley
IBM-GPD
1501 California Avenue
Palo Alto, California 94304

Allen B. Rochkind
Intel Corporation
3065 Bowers Avenue
Santa Clara, California 95051
(408) 987-7817

Douglas B. Smith
University of Michigan
and Industrial Technology, Inst.
Ann Arbor, Michigan 48109
(313) 763-0588

Perry Taylor
IBM Branch Office 129
18000 West Nine Mile Road
Southfield, Michigan 48075

Roger Thompson
IBM
1501 California Avenue
Palo Alto, California 94304
(415) 855-7235

Mike Wolfersperger
Sperry Univac
P.O. Box 500
Blue Bell, Pennsylvania 19424
(215) 542-4313

2. TECHNICAL MATTERS

2.1 FTP Presentation and Agreements

An outcome of the second workshop was the selection of a file transfer protocol to support applications for the demonstration. NBS agreed to prepare a document for the third workshop discussions, based upon the emerging ISO work on FTP. The document was to further define a subset of the ISO FTP service and protocol. This document was prepared by Bolt, Beranek, and Newman, Inc. under contract to NBS, and was presented by Mr. James Berets of BBN.

Agreements reached by the participants with respect to this document follow.

2.1.1 File Length

The maximum file length will be 64K octets. Larger sizes are permitted only by mutual agreement between/among participants desiring to demonstrate bulk data transfer applications.

2.1.2 File Data End (FDE) Request

Three proposals were offered and discussed:

1. Permit combining all or the remaining portion of the data to be transmitted with the FDE. That is, allow "piggybacking" of data PDUs with the FDE PDU.
2. Replace the FDE PDU by an EOT bit in the data PDU as done in Transport.
3. Send the FDE as a separate PDU after all data PDUs have been transmitted. This corresponds to present ISO documentation.

It was decided to support the third proposal, corresponding to the ISO method.

2.1.3 Interpretation of Even Length Protocol Control Information (PCI)

For lower layer protocols it is desirable to insure an even length header (protocol control information) to assist DMA transfers. Several proposals were discussed.

1. The length of the total PDU would be an even number of octets. The end of the header would be padded (if necessary) to achieve an even octet count.
2. Each of the header and the data portions of the PDU would be an even number of octets. Padding would be applied at the end of each as necessary.

Both proposals were rejected. The FTP will not concern itself with whether or not the PDU length is even or odd.

2.1.4 F-Abort Request Diagnostic

It was noted that the Request did not carry a diagnostic field whereas the Indication did permit a diagnostic message to the user of FTP. This is consistent with the ISO specification and was thus left as is. It was noted that the FTP issuing an F-Abort.Indication could specify whether the abort was caused by the network service or initiated by the peer FTP.

2.1.5 F-Transfer End

It was noted that in the NBS input document[1] the F-Transfer End state appeared to be superfluous. It was decided to leave the state (consistent with the ISO specification). Although the state is not logically necessary for the subset of FTP chosen for the demo, it would be logically required for a complete implementation of the ISO FTP.

2.1.6 Maximum PDU Size for Peer FTPs

There shall be no restriction on length of PDUs other than that required by file length. See section 2.1.1.

2.1.7 Write/Create

The possibility of including write and create services for the demo was discussed during the second workshop. A decision was postponed until further discussion at the third workshop. From the discussion during the third workshop it was evident that some participants felt that the write/create should be included in order to lend more credence to the demo. Others felt that schedules did not permit the inclusion of write/create. The following decisions were reached: 1)the prose description of FTP service and protocol will be revised and distributed; 2) the formal description (subgroup B notation) of the protocol will be produced and distributed; and 3) write/create will be described in a separate prose document. If it can be prepared before the fourth workshop in October, then it will be reintroduced for discussion at that time.

2.1.8 Interpretation of ASCII String

The following agreements were reached with respect to files and file contents.

1. In general, there is a need for all 256 characters.
2. For text files a CR should be followed by an LF.
3. Text file applications should expect lower case characters from the network and should convert to upper case if terminal requirements dictate.
4. File names will be a maximum of eight characters in length; the first character will be alphabetic.

The only characters permissible in the file name are: upper case A through Z and 0 through 9. The file name used in the select service primitive will be identical to the name returned; that is, no suffixes

such as generation or version will be appended to the file name appearing in the select.

5. Admitted file types will be:
 - i) text,
 - ii) NAPLPS graphics,
 - iii) 3270,
 - iv) binary data,
 - v) variable length record of ASCII characters; each read request obtains a separate logical record, and
 - vi) Regis graphics.
6. Participants will supply a hardcopy list of all files provided. The file type (see 5 above) will be indicated.
7. Any unrecognizable file name will be treated as a text file.
8. The data field of the FDR will be structured as: one octet specifying data type, followed by the data.

2.1.9 Protocol Errors

Upon receiving an error notification from the peer FTP or upon receiving an error notification from the transport protocol, the FTP will abort. User signalled errors are treated in any way the implementor decides.

2.1.10 User Diagnostics

Reasonable ASCII strings denoting common errors will be documented in the revised prose description of the service and protocol. These strings will be supplied by the document editor and will be reviewed at the fourth workshop.

2.1.11 PDU Format and Encoding

It was decided to follow the format and encoding style used in transport, session, and internetwork. This includes a fixed portion of the header, beginning with two octets of length followed by one octet of PDU type. Following the fixed portion of the header, there may appear a variable portion of the header. Optional header parameters will be encoded using Header Item Coding (HIC). The data portion of the PDU follows the header. The exact format and encoding for each PDU type will appear in the revised prose description of the FTP service and protocol.

It was noted that ISO has not defined the PDU formats and that ANSI has only recently begun to address this problem. The initial ANSI work on FTP PDU formats differs from that of Layers 3, 4, and 5. Participants of the LAN/Transport workshops will alert ANSI to the formatting decisions made for purposes of the demonstration.

2.1.12 Addressing

1. There will be a one-to-one mapping of FTP connections onto Transport connections.
2. A system-wide convention was accepted such that the called address will be eight characters in length. A list will be published for each end-system. The called address translates into a transport address (which is composed of a prefix and a network address).
3. A determination of whether or not the called and calling fields are required or optional in the FCR PDU will be made. If required (according to ISO), then a null address (i.e., value of the length field equal zero) will be used. If optional, then they will be omitted. Called and calling addresses will adhere to the same encoding and conventions accepted for file names. See section 2.1.8, item 4 above.

2.1.13 Octet Ordering in Multi-Octet Fields

In multi-octet fields, such as the 2-octet length field, the least significant octet appears first and the most significant octet appears last. Ordering was debated and the participants were evenly divided in their opinions. It is noted that the decision reached is consistent with multi-octet encoding in Transport PCI. It was further agreed that, should ISO choose a different ordering, that the LAN Transport workshop participants would change accordingly.

2.1.14 Concatenation of PDUs

It was decided that FTP PDUs would not be concatenated as a single TSDU.

2.1.15 Data Discard

It was decided that upon abort, cancel, or T-disconnect, that data received would be discarded.

2.2 File Management Services: Presentation and Agreements

Mr. Allen Rochkind presented a proposal for voluntary implementation of a set of utilities for file server and user. These utilities provide the basis for file installation on file server systems and provide for the display of file directory contents. A document describing this proposal, which was accepted by the participants, will be produced by Mr. Rochkind and distributed by NBS.

2.3 IEEE Statement on Addresses

The IEEE 802 committee met the week of July 11. The proposal (by LAN/Transport participants) for the IEEE to assign the LSAP as 01000001 for this demonstration was discussed. The value chosen by the IEEE was 01111111.

3. ADMINISTRATIVE MATTERS

3.1 Fourth Workshop Arrangements

The participants agreed to the need for a fourth workshop, to be held on October 27 and 28 at the Marriott Hotel in Gaithersburg, Maryland. Announcements will appear in the Federal Register and will be mailed to the current participant list (see section 3.4) of the LAN/Transport Workshop Series.

3.2 Participants Indicating Intent to Participate in Demo

The participants asked that the list of organizations intending to participate in the demonstration be listed in these minutes. After August 15, the deadline established by NBS for companies to make commitments, the participants will be notified of those intending to participate in the demonstration.

3.3 Document Distribution: Tentative Schedule

3.3.1 FTP Service and Protocol Description

A revised version of the input document to the third workshop will be produced and distributed about the first of September.

3.3.2 FTP Formal Description

The protocol as described in the above referenced prose document will be specified using the subgroup B notation of TC97/SC16-WG1. This specification should be available about the middle of September.

3.3.3 Write/Create Service and Protocol

Following development of the above documents, a prose description of the write and create services and protocol will be specified. This document may contain only those services/protocol, or it may be specified as an extension of the document referenced in 3.3.1, but under separate cover. It is hoped that this document can be made available for discussion at the fourth workshop.

3.3.4 File Management

Intel will produce a document describing optional file management services. (See section 2.2.) This document will be distributed by NBS upon receipt from Mr. Rochkind.

3.4 Current LAN/Transport Series Mailing List

Able Computer

Edward Efron
1732 Reynolds Avenue
Irvine, California 92714

Allen-Bradley Company

E. Delahostria
747 Alpha Drive
Highland Heights, Ohio 44143

Bob Jones
747 Alpha Drive
Highland Heights, Ohio 44143

David C. Sweeton
747 Alpha Drive
Highland Heights, Ohio 44143

American Bell

A. A. Akiwpelu
307 Middletown/Lincroft Road
Lincroft, New Jersey 07738

Michael Herrick
307 Middletown/Lincroft Road
Lincroft, New Jersey 07738

Associated Computer Consultants

Joseph Maixner
Local Area Network Center
2901 Park Avenue
Sequel, California 95073

BDM Corporation

John Long
International Support
7915 Jones Branch Drive
McLean, Virginia 22102

Roger S. Novack
7915 Jones Branch Drive
McLean, Virginia 22102

Boeing Computer Services Company

Sheldon Blauman
P.O. Box 24346
Seattle, Washington 98124

Chris Dunlap
7980-90 Gallows Road
Vienna, Virginia 22180

Bolt, Beranek, & Newman

James Berets
10 Moulton Street
Cambridge, Massachusetts 02238

John Burruss
50 Moulton Street
Cambridge, Massachusetts 02238

Ross Callon
50 Moulton Street
Cambridge, Massachusetts 02238

Burroughs Corporation

Scott A. Stein
CNG/Tredyffrin Plan
P.O. Box 203
Paoli, Pennsylvania 19301

Contel Information Systems

Samuel E. Clopper, Jr.
Government Systems Division
11781 Lee Jackson Highway
Fairfax, Virginia 22033

Concord Data Systems

Ross Seider
303 Bear Hill Road
Waltham, Massachusetts 02154

Control Data Corporation

J. L. Nading
4201 N. Lexington Avenue
Arden Hills, Minnesota 55112

B. S. Sekhon
4201 N. Lexington Avenue
Arden Hills, Minnesota 55112

3Com Corporation

Pamela Lawson
1390 Shorebird Way
Mountain View, California 94043

Greg Shaw
1390 Shorebird Way
Mountain View, California 94043

Digital Equipment Corporation

Chak Lai
21333 Haggerty Road
Novi, Michigan 48050

Anthony G. Lauck
1925 Andover Street
Tewksbury, Massachusetts 01876

Jeff Schriesheim
1925 Andover Street
Tewksbury, Massachusetts 01876

E-Systems

Marvin Jenkel
7700 Arlington Blvd.
Falls Church, Virginia 22046

William Livingston
7700 Arlington Blvd.
Falls Church, Virginia 22046

William Miller
7700 Arlington Blvd.
Falls Church, Virginia 22046

Federal Bureau of Investigation

Jerry Smith
Room 8391, TL-245
10th & Pennsylvania Avenue, NW
Washington, D. C. 20535

Fisher Body

Charles D. Groff
30001 Van Dyke Avenue
Warrent, Michigan 48090

Ford Motor Company

Richard Batty
Room 890 WHQ
The American Road
Dearbord, Michigan 48121-1899

Shaun Devlin
Room S-2097, Scientific Research Lab
P.O. Box 2053
Dearborn, Michigan 48121-1899

Melvin Gable
Room E-1174, Scientific Research Lab
P.O. Box 2053
Dearborn, Michigan 48121-1899

General Motors Corporation

Ronald Floyd
GMME&D-MD/66
GM Technical Center
Warren, Michigan 48090-9040

Ken Kanaby
Technical Center, MD-66
Warren, Michigan 48090-9040

Mike Kaminski
Manufacturing Development
Technical Center
Warren, Michigan 48090-9040

Dale F. Larson
GM Technical Center
12 MI&MOUND-N2-GMECC
Warren, Michigan 48080-9040

Gould, Inc.

Rao Cherukuri
6901 Sunrise Blvd.
Ft. Lauderdale, Florida 33310

Hewlett Packard

Ken Aird
3404 E. Harmony Road
Ft. Collins, Colorado 80525

Atul Garg
19420 Homestead Road
Cupertino, California 95014

June Nishimoto
246 Edlee Avenue
Palo Alto, California 94306

Honeywell Information Systems

William Stallings
7900 Westpark Drive
McLean, Virginia 22102

IBM Corporation

G. A. Deaton, Jr.
IBM Communications Products Division
E87/651
P.O. Box 12195
Research Triangle Park, North Carolina 27709

J. J. Quigley
IBM Systems Products Division
24E/037
P.O. Box 10500
Palo Alto, California 94304

Pat Mulvey
24V B231-1
P.O. Box 1328
Boca Raton, Florida

Perry Taylor
2747 Franklin Road
Bloomfield Hills, Michigan 48013

Roger Thompson
1501 California Avenue
Palo Alto, California 94304

ICL

J. R. Cadwallader
West Avenue
Kidsgrove
Stoke-on-Trent ST7 1TL
United Kingdom

John Salter
West Avenue
Kidsgrove
Stoke-on-Trent ST7 1TL
United Kingdom

K. J. Turner
West Avenue
Kidsgrove
Stoke-on-Trent ST7 1TL

Inco. Inc.

Paul Styger
C3I Systems Division
8260 Greensboro Drive
McLean, Virginia 22102

Thomas Trump
C3I Systems Division
8260 Greensboro Drive
McLean, Virginia 22102

Industrial Technology Institute

P. David Fisher
2901 Baxter Road
Ann Arbor, Michigan 48109

Integrated Microcomputer Systems, Inc.

Kenneth Lindsay
1235 Jefferson Davis Highway
Suite 1408
Arlington, Virginia 22202

Howell Mei
1235 Jefferson Davis Highway
Suite 1408
Arlington, Virginia 22202

Intel Corporation

Allen Rochkind
SC6-056
3200 Lakeside Drive
Santa Clara, California 95051

INTERLAN, Inc.

David Potter
3 Lyberty Way
Westford, Massachusetts 01886

Jonathan Taylor
3 Lyberty Way
Westford, Massachusetts 01886

Los Alamos National Laboratory

Don Tolmie
Los Alamos, New Mexico 87545

Mitre Corporation

Paul J. Brusil
P.O. Box 208
Bedford, Massachusetts 01730

David Oppenheim
P.O. Box 208
Bedford, Massachusetts 01730

Motorola

Bruce Loyer
P.O. Box 2953
Phoenix, Arizona 85062

NBI, Inc.

Douglas McCallum
P.O. Box 9001
Boulder, Colorado 80301

Conrad Geiger
P.O. Box 9001
Boulder, Colorado 80301

National Bureau of Standards

Robert Blanc
Institute for Computer
Sciences & Technology
Room A231, Building 225
Washington, D. C. 20234

Dennis Branstad
Institute for Computer
Sciences & Technology
Room A219, Building 225
Washington, D. C. 20234

Robert Carpenter
Institute for Computer
Sciences & Technology
Room A219, Building 225
Washington, D. C. 20234

John Heafner
Institute for Computer
Sciences & Technology
Room B218, Building 225
Washington, D. C. 20234

Jerry Linn
Institute for Computer
Sciences & Technology
Room B212, Building 225
Washington, D. C. 20234

William Majurski
Institute for Computer
Sciences & Technology
Room A219, Building 225
Washington, D. C. 20234

Kevin Mills
Institute for Computer
Sciences & Technology
Room B212, Building 225
Washington, D. C. 20234

James Moulton
Institute for Computer
Sciences & Technology
Room B212, Building 225
Washington, D. C. 20234

Robert Rosenthal
Institute for Computer
Sciences & Technology
Room B226, Building 225
Washington, D. C. 20234

Shirley Watkins
Institute for Computer
Sciences & Technology
Room B226, Building 225
Washington, D. C. 20234

NCR Comten

David W. Tillman
2700 Snelling Avenue North
St. Paul, Minnesota 55113

North Carolina State University

Bill Bhimiak
School of Physical and Mathematic
Sciences & School of Engineering
Box 5490
Raleigh, North Carolina 27650

Phillips Information Systems

Rene Archambault
5250 Ferrier
Montreal, Canada H4B1L4

Siemens AG

Dittmar Janetzky
P.O. Box 211080
7500 Karlsruhe, Germany

Solosystems

Der-Hwa Gan
670 Gail Avenue #E-27
Sunnyvale, California 94086

Source Telecomputing

Leslie Spira
1616 Anderson Road
McLean, Virginia

Sperry Univac

Jim McNulty
P.O. Box 500
Blue Bell, Pennsylvania 19124

Mike Wolfersperger
P.O. Box 500
Blue Bell, Pennsylvania 19124

Sytek, Inc.

William C. Taylor
6000 Executive Blvd.
Suite 205A
Rockville, Maryland 20852

Systems Architects, Inc.

Ashok Kuthyar
510 W. Annandale Road
Falls Church, Virginia 22046

Tektronix, Inc.

Maris Graube
P.O. Box 500
Beaverton, Oregon 97077

Andy Luque
P.O. Box 500
Beaverton, Oregon 97077

University of Michigan & Industrial Technology
Institute

Douglas B. Smith
Ann Arbor, Michigan 48109

Ungerman-Bass

John M. Davidson
2560 Mission College Blvd.
Santa Clara, CA 95050

Xerox Corporation

Juan Bulnes
OPD Office Systems Business Unit
3450 Hillview Avenue
Palo Alto, California 94304

REFERENCE

- [1] "Multi-Vendor Demonstration File Transfer Protocol," NBS, B218, Technology Building, Washington, D. C. 20234.

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Proceedings of the Second LAN-Transport Workshop, NBSIR 83-2717, National Bureau of Standards, Washington, D. C., May 5 - 6, 1983.

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11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here) The National Bureau of Standards' Institute for Computer Sciences and Technology (ICST) has prepared specifications for the International Organization for Standardization's (ISO) Class 4 Transport Protocol. At the request of a number of companies, ICST organized a workshop series for local area network implementors of these specifications. The first workshop focused on implementation techniques and strategies so that a multi-vendor demonstration of these protocols can occur at a major conference in 1984--targeted for the NCC 1984. Primarily, the details of CSMA/CD and Transport Class 4 were discussed and parameters were selected. A second workshop focused on token bus LANs and file transfer application to be run at the targeted 1984 demonstration. This report covers the third in the series of LAN/Transport Workshops, and reports agreements on the specifics of the transfer protocol.						
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